

U.S. Patent Application Serial No. 09/746,064
Response Under 37 C.F.R. §1.116 dated September 22, 2003
Reply to Final Rejection of June 20, 2003

REMARKS

Claim 14 was canceled. Claims 3 - 8 and 10 - 13 are pending in the instant application. The rejections set forth in the Office Action are respectfully traversed below.

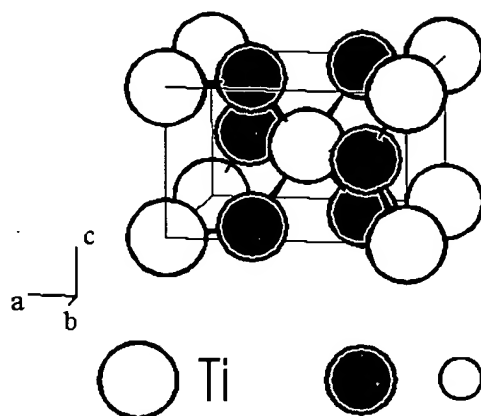
Claim 10 stands rejected under 35 U.S.C. §103(a) as being unpatentable over AAPA in view of **Imaizumi et al.** (of record). Amended claim 10 (incorporating the subject matter of canceled claim 14) recites the feature that the intermediate (TiO_2) layer has a thickness of about 4 nm (or 40 angstroms). The Office Action stated:

Imaizumi further discloses that the oxide thickness must be limited to less than 10 monolayers (e.g. col 2, line 15 and line 56; col. 4, line 7 and line 37). Note **Teraguchi** '514 which provides evidence of the fact that the lattice constant of TiO_2 is 4.593 angstroms (see col. 5, Table 3). As such, **Imaizumi**'s disclosure of an oxide thickness that is less than 10 monolayers can be restated as saying that the oxide thickness must be less than about 4.593 nm, which reads on the thickness set forth in claim 14.

The Applicant respectfully traverses the rejection. It is acknowledged that TiO_2 has a lattice constant of 4.593 angstroms according to **Teraguchi**. Attached below is the unit cell crystal structure of TiO_2 having a rutile structure. Reference should be made to

<http://www.chm.davidson.edu/chemistryapplets/crystals/ionicsolids/rutile.html>, or

<http://www.chemistry.ohio-state.edu/~woodward/ch754/TiO2.htm>



As can be seen, one unit cell of TiO₂ includes two Ti atoms, one at the center and the other at the eight corners each having the size of 1/8. Corresponding to this, there are included four oxygen atoms in a single unit cell. This means that one unit cell of TiO₂, having the lattice constant of 4.593 angstroms at each edge, in fact includes therein Ti₂O₄ or two TiO₂ molecules and that one single TiO₂ molecular layer should have the thickness of $4.593/2 + 2.297$ angstroms or 0.2297 nanometers.

Thus, when ten of such TiO₂ monolayers are stacked as set forth in **Imaizumi**, the total thickness would be 2.297 nm, which is only about one-half the thickness of the TiO₂ layer claimed in claim 14.

Therefore, the thickness of 4 nm as recited in claim 10 is not anticipated by **Imaizumi**. Further, **Imaizumi** teaches away from the use of the thickness of more than 10 molecular layers in column 2, line 50. Thus, a person skilled in the art would not be motivated to modify the teaching

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of **Imaizumi** to use the TiO₂ layer of 4 nm as set forth in amended claim 10. For at least these reasons, the present claimed invention patentably distinguishes over the prior art. An early Notice of Allowance is respectfully requested.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicant's undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicant respectfully petitions for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

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